

GS106 Key Lab 1  
Properties of Water

	Metal Cylinder #1 gold in color	Metal Cylinder #2 silver in color
Mass	57.05g	17.9g
Final vol	21.5 ml	21.5 ml
Initial vol	15 ml	15 ml
Vol of cyl.	6.5 ml	6.5 ml
Density (m/v)	57.05g/6.5ml = 8.77g/ml	17.9g/6.5ml = 2.75g/ml
Compostion	brass → 8.56g/ml	aluminum → 2.70 g/ml
% error	$\frac{(8.56\text{g/ml}) - (8.77\text{g/ml})}{(8.56\text{g/ml})} * 100 = -2.45\%$	$\frac{(2.7\text{g/ml}) - (2.75\text{g/ml})}{(2.7\text{g/ml})} * 100 = -1.85\%$

Possible reasons for the error include rounding errors, not reading the volume accurately, not weighing the cylinders accurately. **NEVER say human error.** Tell me what the error is!

**Part B:**

Activity 2: this activity looks at surface tension and water and how it changes due to the addition of a detergent. The detergent causes a lower surface tension due to the disruption of the hydrogen bonds between the water molecules. You should have noticed that when you dropped the detergent in the center of the thread that it “pushed” the thread out from the center and then the thread sank. The thread sinks because of lower surface tension. When the detergent is dropped beside the thread, it causes the thread to be “pushed” to the side of the dish.

Activity 3: Surface tension is also responsible for the number of water drops you can put on a penny. The idea behind surface tension is that water molecules attract each other so they “pull” together. This “stickiness” allows many drops to be placed on a penny. I got 31 drops. The number varies between 20 and 35. Why is there so much variance? What are possible sources of error?

**Part C**

The purpose of these experiments was not just to figure out which sample was water but to do a series of experiments in a consistent manner. Some of the important techniques include washing your equipment with distilled water between experiments and making sure volumes of solids and liquids were the same for each experiment. Additionally, observation is also very important. For example, noticing if something totally dissolves or how the oil floats on the liquid. The page below were the results of my experimentation and some of the things I noted:

**PG10:**

Based on my experiments I decided #2 was the water sample. This was due to the pH, The way the oil floated on the surface (similar to the water sample), and the evaporation experiment. I decided 1 wasn't based on the pH value, 3 wasn't since it left a residue after evaporation and it didn't dissolve the salt or sugar, and 4 wasn't due to the way the oil spread out on the top of the solution rather than beading up.

Be sure you spend some time thinking about the most and least effective tests and the “whys” associated with them. Make sure the why you come up with is specific and not a generic answer.

Experiment	Water	Liquid 1	Liquid 2	Liquid 3	Liquid 4	Comments
pH	7	10	7	7	6	It was important to let the ph strips sit for a couple of min to get an accurate read
Float: ice toothpick oil	yes yes yes (beaded)	yes yes yes	yes yes yes	yes yes yes	yes yes yes	Note: the oil in 1 & 2 beaded up but the oil in 3 & 4 spread out
Dissolution salt (15 sec) sugar (30 sec)	yes yes	partial yes	yes yes	no no	yes yes	I only used a pinch of each and the same volume of liquid
Temp. Change hot cold	80.7-22.4= 58.3 24.7-4.2= 20.5	84.2-21.8= 62.4 25.2-2.7= 22.5	83.9-22.8= 61.1 24.8-2= 22.8	82.8-22.9= 59.9 24.9-4.9= 20	83.9-23.6= 60.3 24.3-3.7= 20.6	
Evaporation: time comments	6.5 min	6 min left funky residue	7 min	5 min crystallized	9 min	This information I took off labs that were turned into me.
Student test: I used the drops on a penny for this test	First test 32 Second test 24	14	20	33	31	the second test on the water sample was done after the other samples were tested so the penny was just dried off for all the tests